UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,633	07/30/2004	Ari Hottinen	61253.00023	3037

32294 7590 07/11/2007

SQUIRE, SANDERS & DEMPSEY L.L.P.
14TH FLOOR
8000 TOWERS CRESCENT
TYSONS CORNER, VA 22182

EXAMINER	
MATIN, NURUL M	
ART UNIT	PAPER NUMBER
2611	

MAIL DATE	DELIVERY MODE
07/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,633	HOTTINEN ET AL.	
	Examiner	Art Unit	
	Nurul M. Matin	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31-59 and 73-75* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31-35,37-46,48-59 and 73-75* is/are rejected.

7)☒ Claim(s) *36 and 47* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *07/02/04, 12/12/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The amendment filed on April 24th, 2007, overcomes the following objection/rejection of the last Office Action:

a) Rejection to the claims 39-40, 42-48 for 35 U.S.C. 112, first paragraph.

Response to Arguments

2. Applicant's arguments, see remarks, filed 04/24/2007, with respect to the rejection(s) of claim(s) 31-60 under 102(a) & 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Onggosanusi et al, US 2002/0196842.

Claim Objections

1. Claims 31, 53, 57 are objected to because of the following informalities:

In claims 31, 53, 57, where it says, "using substantially orthogonal signalling", it should be "signaling".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 31-35, 37-46, 48-59, 73-75 are rejected under 35 U.S.C. 102(e) as being anticipated by Onggosanusi et al, US 2002/0196842.

Re claim 1, Onggosanusi discloses a method of transmitting complex symbols using a transmission code matrix, said method comprising: constructing said transmission code matrix, and transmitting said transmission code matrix, at least partially in parallel (fig.4, it shows that STTD (105 (1 & 2)) are in parallel), using substantially orthogonal signaling resources and at least three different transmit antenna paths (fig.4, page 12, Para [0094], "Another set of linear basis transformation matrices from which V.sup.(n) basis selector block 84', and which arises due to the use of STTD encoding, is the use of a set of permutation matrices. Specifically, a set of permutation matrices may be defined based on the number of transmit antennas, P, where each matrix has P.times.P elements and is either the identity matrix I or an orthogonal permutation of that matrix"); wherein said transmission code matrix can be expressed as being constructed using at least two transformed transmit diversity code matrices (fig.4, page 11, Para [0084], where STTD (105(1 & 2) are the two transmit diversity code matrices); wherein said transformed transmit diversity code matrices can be expressed as being constructed by transforming at least two code matrices using linear transformations(fig.4, page 11, Para [0083], where it says STTD encoder 105.sub.1 receives symbols s.sub.1,1 and s.sub.1,2, while STTD encoder 105.sub.2

receives symbols s.sub.2,1 and s.sub.2,2) and wherein said transmit diversity code matrices, at least one of which is of dimension greater than one, can be expressed as being formed by modulating at least two at least partially different streams of complex symbols that are obtainable from a single stream of complex symbols by conversion(fig.4, page 11, Para[0084], "The outputs of STTD encoders 105.sub.1 and 105.sub.2 are connected to a matrix multiplication block 107. Matrix multiplication block 107 multiplies those outputs times a linear basis transformation matrix V.sup.(n), where V.sup.(n) is in general developed in the manner described above with respect to system 70, with two exceptions. First, in system 100, V.sup.(n) is a 4.times.4 matrix because P=4. Second, because system 100 is an STTD-type system rather than a MIMO-type system, then the set [V.sup.(n)].sub.n=1.sup.N may include matrices differing from those preferred for a MIMO system. These differences are further explored later. Also as detailed below, while V.sup.(n) is a 4.times.4 matrix in connection with system 100 which therefore includes 16 values, in the preferred embodiment the sets of [V.sup.(n)].sub.n=1.sup.N include matrices including values of zero and non-zero).

Re claim 32, Onggosanusi discloses wherein constructing said transmission code matrix comprises: converting a stream of complex symbols to at least two at least partially different streams of complex symbols (see fig.4); modulating said at least two streams of complex symbols to form at least two transmit diversity code matrices, at least one of which is of dimension greater than one (see fig.4); transforming said transmit diversity code matrices using linear transformations, to construct at least two transformed transmit diversity code matrices(see fig.4 and page 11, Para [0083] &

[0084]; and constructing a transmission code matrix using at least two transformed transmit diversity code matrices(see fig.4).

Re claim 33, Onggosanusi discloses that at least one of the linear transformations is different from an identity transformation (page 11, Para [0084] & page 12, Para [0094]).

Re claim 34, Onggosanusi discloses that at least two transmit diversity code matrices are orthogonal transmit diversity code matrices (fig.4, page 11, Para [0084]).

Re claim 35, Onggosanusi discloses both the matrix dimensions of the transmission code matrix are greater than the corresponding matrix dimensions of the transformed transmit diversity code matrices (page 8, Para [0062]).

Re claim 37, Onggosanusi discloses that the transmission code matrix can be expressed as being is constructed from the transformed transmit diversity code matrices using at least one of the methods of repetition, negation, conjugation, permutation, multiplying with a matrix (page 12, Para [0089], line 11-14).

Re claim 38, Onggosanusi discloses the first transformed transmit diversity code matrix can be expressed as being constructed by summing two transmit diversity code matrices, and the at least the second transformed transmit diversity code matrix can be expressed as being constructed by subtracting the said two transmit diversity code matrices (see fig.4).

Re claim 39, Onggosanusi discloses that the symbol rate of the transmission code matrix is the same as an average symbol rate of the orthogonal transmit diversity

code matrices to which the linear transformations are applied (page 1, Para [0004], page 2, Para [0013] and page 11, Para [0084]).

Re claim 40, Onggosanusi discloses that the transmission code matrix extends over T substantially 0rthogonal signaling resources, and wherein more than T complex symbols are used to construct the transmission code matrix (see fig.4).

Re claim 41, Onggosanusi discloses that conversion comprises a serial-to-parallel conversion (see fig.4).

Re claim 42, Onggosanusi discloses that conversion comprises a rotation unit (see page 9, Para [0067], page 13, Para [0097]).

Re claim 43, Onggosanusi discloses the rotation unit is a symbol rotation matrix that differs from an identity matrix, and contains at least two zero-elements (page 4, Para [0027] and [0032] and [0036]).

Re claim 44, Onggosanusi discloses that the rotation unit is a symbol rotation matrix that is formed as Kronecker product of two unitary matrices, where at least one is different from an identity matrix (page 12, Para [0090] and [0092]).

Re claim 45, Onggosanusi discloses the symbol rotation matrix is a diagonal matrix, where at least one diagonal element is a complex number (page 4, Para [0028]).

Re claim 46, Onggosanusi discloses that at least two transformed transmit diversity code matrices are transmitted in parallel, and wherein the two transformed transmit diversity code matrices contain at least partially different symbols (see fig.4).

Re claim 48, Onggosanusi discloses that there are four substreams and wherein each substream is modulated to form an orthogonal 2 x 2 transmit diversity code matrix

incorporating two complex symbols, and wherein the transmission code matrix extends over at least four substantially orthogonal signaling resources (see fig.4 and page 11, Para [0048]).

Re claim 49, Onggosanusi discloses at least one transmit diversity code matrix has a different symbol rate than another transmit diversity code matrix (see fig.4).

Re claim 50, Onggosanusi discloses that at least one transmit diversity code matrix has different dimensions than another transmit diversity code matrix(see fig.4, page 11, Para [0083] & [0084]).

Re claim 51, Onggosanusi discloses that at least one transmit diversity code matrix is transmitted with different power than another transmit diversity code matrix (page 10, Para [0075], page, 6, Para [0050]).

Re claim 52, Onggosanusi discloses that the substantially orthogonal signaling resources include at least one of the following: non-overlapping time slots, different spreading codes, different OFDM subcarriers, different wavelet waveforms and different FDMA channels (see fig.4 and page 6, Para [0052]).

Re claims 53-58, which claims the same subject matter as recited in claim 31-34. Therefore, claims 53-58 have been analyzed and rejected with respect to claim 31-34.

Re claim 59, Onggosanusi discloses that the transmission code matrix can be expressed as being constructed using two transformed transmit diversity code matrices residing on the block-diagonal of said transmission code matrix (see fig.4), wherein one of said transformed transmit diversity code matrices can be expressed as being constructed as a sum of two transmit diversity code matrices (fig.4), and wherein the

other transformed transmit diversity code matrix can be expressed as being constructed as a difference of said two transmit diversity code matrices(see fig.4, page 11, Para[0084]), and wherein said two transmit diversity code matrices can be expressed as being formed by modulating two different streams of complex symbols that are obtainable from a single stream of complex symbols(see fig.4, page 11, Para [0083] & [0084]).

Re claims 73-75, which claims the same subject matter as recited in claim 59. Therefore, claims 73-75 have been analyzed and rejected with respect to claim 59.

Allowable Subject Matter

3. Claims 36, 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nurul M. Matin whose telephone number is 571-270-1188. The examiner can normally be reached on mon-fri (7:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Nurul Matin
Assistance Examiner, Art Unit # 2611

MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER